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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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09/739,620 12/29/00 ODA

N Q61572

EXAMINER

MM91/0926

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WASHINGTON DC 20037-3202

NGUYEN, H

ART UNIT

PAPER NUMBER

2812

DATE MAILED:

09/26/01

**Please find below and/or attached an Office communication concerning this application or proceeding.**

**Commissioner of Patents and Trademarks**

**Office Action Summary**

Application No.

09/739,620

Applicant(s)

ODA, NORIAKI

Examiner

Ha T. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 07 September 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) 12-24 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 December 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Notice to applicant***

1. Applicant's election without traverse of Group II, claims 1-11, is acknowledged.

### ***Claim Objections***

2. Claim 1-11 are objected for containing the following informality: in claim 1, line 4, "first" should be deleted to avoid problem of lacking antecedent basis.

Claims 2-11 depend from claim 1, they are objected for the same reason.

### ***Claim Rejections - 35 USC § 112***

3. Claims 4, 5, and 11 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 4 and 11 recites the limitations "third cover" in line 4 of claim 4 and "the trench" in lines 2-3 of claim 11. There is insufficient antecedent basis for these limitations in the claims.

Claim 5 depends from claim 4, it is rejected for the same reason.

### ***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371<sup>6</sup> of this title before the invention thereof by the applicant for patent.

5. Claims 1, 2, are rejected under 35 U.S.C. 102(b) as being anticipated by Geffken et al., U. S. Patent 5985762 (Hereinafter Geffken).

As to claim 1, referring to fig. 3D, Geffken discloses a semiconductor device comprising: a substrate 21 having a surface; a dielectric 23 formed over the surface of the substrate; and a wiring line buried in the dielectric layer; the wiring line including a Cu-based conductor 30 and first cover layer 29 covering an outer surface of the conductor; the first cover layer being made of refractory metal nitride (see col. 3, lines 35-39).

As to claim 2, Geffken discloses wherein the first cover layer is made of nitride of at least one selected from the group consisting of Ti, Ta and W (see col. 3, lines 35-39).

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 3-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Geffken, in view of Farkas et al., US Patent 6001730 (hereinafter Farkas).

As to claim 3, Geffken discloses substantially the limitations of claim 3, as shown above.

But it does not disclose expressly a second cover layer provided between the conductor and the first cover layer; wherein the second cover layer covers entirely or partially the outer surface of the conductor, the second cover layer being made of refractory metal.

As to claims 4 and 5, Geffken discloses a dielectric cover layer 28 covering entirely or partially the outer surface of the conductor at its each side.

But it does not disclose expressly that the dielectric cover layer is provided between the conductor and the first cover layer.

As to claim 6 which comprises the limitations of claims 3 and 4, a argument similar to the rejection of claims 3 and 4 applies.

As to claims 7 and 8, Geffken discloses wherein the dielectric formed over the surface of the substrate is made of inorganic material and has a relative dielectric constant ranging from 1.6

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to 9 or organic material and has a relative dielectric constant ranging from 1.6 to 3 (see col. 3, lines 5-10).

However, the missing limitations are well known in the art because Farkas discloses a diffusion layer for Cu which could be a combination of layers of Ta, TaN, TaSiN...etc (See col. 4, lines 48-58) when Farkas combination is used in Geffken, the limitations of claims 3-6 are met.

A person of ordinary skill is motivated to modify Geffken with Farkas for better protection against diffusion of Cu .

Therefore, it would have been obvious to combine Geffken with Farkas to obtain the invention as specified in claims 3-8 .

8. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Geffken, as applied to claims 1 and 2 above, and in view of Li et al., U.S. Patent 6040243 (Hereinafter Li).

Geffken discloses substantially the limitations of claim 10, as shown above.

But it does not disclose the composite structure comprising a first dielectric layer, an etch stop layer formed on the first dielectric layer, and a second dielectric layer formed on the etch stop layer; wherein the bottom of the first cover layer is approximately in a same level as an upper surface of the first dielectric layer and the top of the first cover layer is approximately in the same level as an upper surface of the second dielectric layer.

However, these are well known in the art because Li discloses these features (see fig. 8 where 62 is the first dielectric layer, 72, the etch stop layer and 76, 80, 84 and 88 the first dielectric layer ).

A person of ordinary skill is motivated to modify Geffken with Li to obtain controlled etching of the trench.

Therefore, it would have been obvious to combine Geffken with Li to obtain the invention as specified in claim 10.

9. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Geffken in view of Nogami et al., U.S. Patent 6214731 (Hereinafter Nogami).

Geffken discloses substantially the limitations of claim 10, as shown above.

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But it does not disclose expressly a via hole of tapered shape with the claimed slope.

However, it is well known in the art because Nogami discloses this feature (See fig. 1A ).

A person of ordinary skill is motivated to modify Geffken with Nogami to obtain good filling of the contact hole.

Therefore, it would have been obvious to combine Geffken with Nogami to obtain the invention as specified in claim 11.

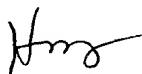
### *Conclusion*

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ha Nguyen whose telephone number is (703)308-2706 . The examiner can normally be reached on Monday-Friday from 8:30AM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Neibling, can be reached on (703) 308-3325. The fax phone number for this Group is (703) 308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.

Patent Examiner



Ha Nguyen

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